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Emerging digital media culture in Russia: modeling the media consumption of Generation Z

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ABSTRACT

Digital media is now the dominant influence of peoples' everyday lives and social behavior in the global culture of twenty-first century society. Contemporary media usage is associated with the need for affection and involvement in social and cultural communities and approval and integration into the emerging digital culture. Thus, it is possible to observe signs of such important processes as socialization and self-actualization in media practices of the youth audience in digital media culture. These needs are strongly related to cultural and social processes and have been normally achieved in an individual's cultural and social environments. This becomes crucial for the understanding of new digital media culture (DMC). The paper provides a theoretical discussion of this emerging DMC in Russia, conceptualizes Generation Z's needs and motives and everyday media practices. In order to do this, the study conducted interviews with Russians aged 10–19 years old from Moscow, Nizhny Novgorod and Rostov-on-Don. The authors use mathematical methods to construct a model of Generation Z's media consumption.

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Digital media; media culture; generation Z; media consumption; mathematical modeling

Introduction

In today's digital environment, media consumption is changing and transforming people's social practices and daily behavior (Couldry and Hepp 2016; Vartanova 2013). Media is now not just a source of information, but also an environment for self-expression, and an opportunity to realize the communicative needs of a person, and a resource for self-education (McQuail 2002). Media's changing role in modern society is reflected in the younger generations who are the first to perceive new digital practices and are the most integrated into the digital environment (Prensky 2001) of the twenty-first century. Research into the culture of the youth audience today enables scholars to identify the transformations society will experience in the future. The behavior characteristic to youth may in the future become the norm for the whole of society (Howe and Strauss 2007; Soldatova, Rasskazova, and Nestik 2017).

The rapid expansion of Russia's youth audience in the 2010s, with broadband internet penetration rising from 30% of the population in 2011 to 75% in 2016 (CIA Factbook), occurred at a time of great political activity, societal integration and personal self-

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realization. There was also structural change in the digital environment away from the Western model, which led to changes in media consumption. This is why the questions we pose in this paper are related to a new cultural structure and the role of the media in its formation (Gladkova and Korobeinikova 2016).

This paper continues the tradition of cultural discourse research, which as Shi-xu (2005) argues, explores the spaces 'between cultures' and focuses on the intermediate space between Russia's culture of social reality and the nation's emergent Russia-specific digital media. The major challenge facing national cultures globally, in the twenty-first century, is not so much the globalization or westernization of culture, but that of social media and internet platforms that universalize not just transmitted meanings, but also human practices and communications, social interaction, identities and the life worlds of individuals. The digital media culture (DMC) is closely related to corporate giants like Facebook, Google, Twitter and Apple, each of which has a strong US national cultural identity. This is a matter of concern for the cultural security of Russian society. Consequently, our research mission is to resist the west-centric discourse and provide a cultural-political response (Curran and Park 2000; Gladkova et al. 2019; Vartanova 2009).

Contemporary academic knowledge about human discourse requires multi-paradigmatic and interdisciplinary approaches:

> … human discourse is re-conceptualised as multi-faced but integrated communicative event (or a class thereof named activity) in which people accomplish social interaction through linguistic and other symbolic means and mediums in particular historical and cultural relations. This re-definition of the object of enquiry allows researchers to go beyond the mono-causal, mechanistic explanation and take all the components and all the relations of the communicative event/activity as potentially questionable topics: the subjects and identities, acts and intents, mediums and channels (including temporal and spatial settings), purposes and effects, historical and cultural relations involved. (Shi-xu 2016: 3)

Russian discourse studies are more inclined towards Eastern discourse (Shi-xu 2014: 35–55). The theoretical context of these relevant practical cultural issues should remain in the focus of research and be constantly supplemented (Thussu 2009; Vartanova 2018, 2019).

Our *first hypothesis* is based on the thesis that the spread of social media transforms the needs of the audience, because it offers not only monolog information, entertainment and knowledge of the process of media consumption, but also provides the opportunity to participate in dialogic transfers of information and thus meet a user's social and cultural needs. This hypothesis became the basis for the formulation of *Research Question (RQ)1*: Is it possible to observe the emerging DMC, in which the basic human needs of socialization and self-actualization are realized in different ways?

Our second hypothesis arises from the problem of the relationship and lack of clear distinction between the 'new DMC' and other contemporary designations of culture such as media culture in general, and the highly specific virtual reality. On this basis, we formulated *RQ2*: What are the status and its main characteristics of DMC?

The *third hypothesis* is based on the assumption, that the process of media consumption has transformed the needs of Russia's youth audience. While, the motives associated with the need for socialization and self-actualization will be a priority for users, the lack of a clear hierarchy of needs influenced the formulation of *RQ3*: What is the hierarchy of the youth audience's media consumption needs?

The *final hypothesis* proceeds from the idea of the transformation of theoretical knowledge in the field of media research, which in the 2020s is closer to cultural studies in the contexts of theoretical and conceptual apparatus and the move towards interdisciplinarianism and accuracy in methods and methodologies (Shi-xu 2014: 21–34). Our final research question is related to a mathematical model of media consumption of youth audiences. Such a model would help to predict and calculate the future dynamics of media consumption by a youth audience and any possible cultural consequences. *RQ4*asks: What is the specific structure of the mathematical model of the media consumption of Generation Z?

The main goal of this paper is to explore media consumption patterns of Russia's Generation Z in the context of the nation's emerging DMC. The paper explores the DMC in two ways. First as both a reality and a philosophical concept. Secondly, as an outcome not only of increased mediatization and the deep penetration of social media, but also their ability to create interactions at macro (societal) as well as micro (individual) levels.

Literature review

Emergence studies

The ever-growing use of media communication technologies, the development of social media platforms and the establishment of a new generation of digital natives have collectively led to the establishment of a new type of social order – a DMC society. This emergence occurs at various levels: throughout society, political forces, culture and everyday human experiences (Gunaratne and Gunaratne 2017; Preholer and Bettstetter 2005).

The process of emergence in cultural studies is based on the need of human societies to adapt to ever-changing living conditions through the creation of new forms of activities and social interaction (Murdock 1949). The semiotic theory holds culture is created when there is a codification of information, i.e. the creation of symbols and systems of their connotations (Barthes 1994). Mimetic ability is the human capacity to incorporate images of the physical external world into the inner world and thus create the relevant cultural conditions; this is a crucial stage of cultural learning (Wulf 2004: 134).

The functionalistic approach in cultural studies is a significant addition to the semiotic theory in culture genesis (Keller 1915). According to this approach, culture is adaptive or functional and, as Malinowski (1945) explains, serves to satisfy the ability of individuals to act in concert, unite to create teams to perform any given tasks.

These two approaches accumulate modern anthropological knowledge about society, which as a result of voluntarily accepted technological changes society is sometimes forced to change. However, mainstream societies have never been static (Yilidrim and Canbolat 2017: 111). Thus, a specific type of culture associated with the expansion of the media communication space and the evolution of the process of the mediatization of social reality emerges.

Mediatization concept

The typological distinctions of the DMC are its semiotic essence and technologically determined means of its realization (Acerbi 2016; Kirillova 2011). Mediatization is a key process

of today's world, a meta-process that cuts across all spheres of the functioning of society and human cultural practices (Couldry and Hepp 2016). Contemporary media consists not only the technology of transmission, broadcast channels, platforms and systems for distributing content, but also social-related objects such as social space, institutions, structures, and social processes at the personal, national and global levels. Media are becoming an important agent of human socialization. Objective reality exists through the media. Through the process of mediation, media do not only reproduce the social world but also creates and supports a new type of subjective reality, which is referred to as media reality or virtual reality and is a component of the DMC.

As an influential agent of socialization, the media has for a long time been embedded in the systems of production and dissemination of knowledge, and norms and values. Here, the technological infrastructure of communication and the broader sociocultural contexts, in which media consumption practices are realized, assume fundamental significance. Couldry and Hepp (2016) insist that a fundamentally different mediatized social reality requires the revision of the classic social theory developed by Berger and Luckmann (1966). For Berger and Luckmann, the media confirmed the reality of the social world, reporting facts about it, history and analysis, and acting in the interest of the social order as a subsystem of society, focused on maintaining the balance and stability of the whole system. Today, the situation has changed: attributive characteristics of the social system are now inherent to the media, and thus the media are no longer a subsystem of society and no longer connected to social reality. Media are a reality. Luhmann took note of this peculiarity of media communication to possess constitutive characteristics of a social system (2000) and he argues media communication was never a subsystem component but was rooted in the structure of the entire system.

Fundamental changes in the principles of the functioning and structure of society and the establishment of new types of cultures, e.g. the DMC, are associated with media consumption practices, primarily among the youths, the motivations that guide them in the process of media consumption, and the factors that determine them. It is noteworthy that the youth as a media audience today best reflects the fundamental changes in media practices that transform theoretical knowledge.

Uses and gratification theory

The classic use and gratification theory need rethinking when the peculiarities of youth digital media consumption, particularly social media, are discussed (Kurzban et al., 2015; Kurzban, Burton-Chellew and West 2015; Lang and Bradley 2010; Lee and Ma 2012; Sundar and Limperos 2013; Quan-Haase and Young 2010).

Social reality, in traditional, was founded on social structures and as a result of the social interaction of individuals, and not as a result of the process of mediatization. The needs of the audience were met through mediation, which as Vartanova (2013) argues is why information needs remained at the top of the hierarchy of media needs for so long.

The primary function that media theory classics focused on was socialization. Furthermore, although the need for socialization has not been clearly articulated, because it was seen as a media effect, the importance of the media for the audience in the process of social integration has often been discussed (Katz et al. 1973; Lasswell 1948; December 1996). Self-actualization is traditionally tied to the possibility of using information

published in the media for one's creative work (Fink 1996: 134–5). McQuail (2002: 27–8) points out that the media enables the audience to place themselves into the life circumstances of others in an imaginary way. This creates a sense of belonging and helps in the choosing social of roles and practically changes real interaction, and also in the process of self-analysis (McQuail 2002: 27). This approach involves interaction with the media not as a technological channel for delivering content, but as similar to interaction with real people (Deci and Ryan 2008; Palmgreen et al., 1980: 165). Both socialization and self-actualization are at the peak of Maslow's pyramid (Maslow 1970), and the media's ability to be an active agent in the satisfaction of these needs actually makes them significant in the twenty-first century.

Mathematical approaches to media consumption

According to Taneja et al. (2012), there are two main approaches for analyzing the factors motivating media consumption. The first may be defined as 'structural', as it explores structures like program schedules as the main factor affecting media consumption, and focuses on investigating the influence of program-scheduling characteristics on television audience duplication (Cooper 1996; Goodhardt et al. 1987; McDowell and Sutherland 2000; Webster 2006). Aggregate measures of media consumption, like ratings and shares, form the main type of data used by this approach.

The second approach assumes the importance of intrinsic psychological factors, like needs and preferences, in determining media choice. It is based on the concept of media consciousness: people are active agents who make purposeful, rational choices when they consume media, the same is in basic microeconomic settings about the utility function and general preferences. If the considered subjects behave as they have the stable preferences (and a corresponding utility function), then it becomes possible to model their behavior using these mathematical objects – even if the subjects do not realize the existence of such characteristics. So here we may repeat Friedman's argument (Friedman 1953) regarding pool players who make shots while they calculate the ball's trajectory according to the laws of velocity, momentum, and angles from theoretical physics. But most pool players asked whether they precisely understand the principles of physics behind the game will undoubtedly answer that they do not. Nonetheless, the laws of physics provide very precise predictions, so they should be accepted as an appropriate theoretical model for professional pool players' decision-making.

Media consumption may be regarded as a mechanism similar to 'ordinary' consumption, which is used to gratify individual needs (Katz et al. 1973; Malthouse and Peck 2010; Ruggiero 2000). This is exactly the same approach as the microeconomic preferences-based approach to model traditional consumer behavior: the models of media choice assume media consumption is shaped by well-informed 'media' preferences (e.g. Owen and Wildman 1992).

This approach leads us to the second large group of mathematical methods used to analyze media behavior: constructing analytical models of making decisions regarding media consumptions. The problems here are twofold: How are 'media' preferences formed and how do they affect the structure of media practices of the studied subjects. Two types of problems each generate an approach to develop analytical models of Generation Z media consumption. The main difference between them is in the consciousness level of the decisions to be made. The first approach assumes that media behavior

depends fully on the audience's social environment. The approach deals with graph theory and Markov chains-based models of influence and information distribution in social networks. The latter are one of the most important elements of the 'new reality' in which post-millennial generations 'live'. Markovian, directed graph-based models reflect many qualitative features of information dissemination in networked public structures, including an avalanche-like distribution. In a directed graph-based model of a social network, one may regard the network's members as vertices, while the directed edges represent the statuses of 'Follower' or 'Friend'. The strength of an individual's influence on any follower is measured by a real number from the unit interval [0,1], which may be interpreted as a 'trust share': 0 means that the follower does not trust the individual at all, 1 means that the follower fully trusts the individual's opinion, any intermediate value stands for more complicated reliance (e.g. 0,75 may be interpreted as 'the follower relies on the individual's opinion in general, but may have some minor issues of distrust'). This directed graph-based model considers, for example, two youngsters from the same school, who follow each other in a social network, as the neighboring vertices in a big graph of the network. The closer they areas friends the greater is the influence value assigned to the directed edges connecting them. When the members of the social network are involved in the process of information dissemination, they are changing their attitude to this information under the influence of the nearest 'neighbors' through the network. When we model this influence using the rules of Markov chains, the dissemination process gets an avalanche-like view.

On the other hand, it becomes important to identify and model motivational factors, which influence multimedia content choice. In order to do so, factorial and correlation analyses of survey results of representative post-millennials are used. In fact, one should consider construction of a time and attention (both scarce resources) distribution model between a finite number of media activities. Each Generation Z individual has their own system of values – material and spiritual needs – of which maximum satisfaction is the goal of media consumption. Thus, a media consumption model belongs to the category of mathematical programming problems and is similar to the consumer behavior model.

Materials and methods

Our research group decided to study the motivational factors that determine the media consumption of a youthful audience in Russia. Motivational factors can, once they are identified, reveal profound changes in the structure of media consumption, not only in terms of quantitative indicators but also in terms of changes in social practices. The study was conducted in two stages. The first involved interviewing a small randomly selected sample of Russian youths aged 10–19 years. The second will involve a large-scale survey of Russian youths. This paper presents the results of the first stage. We conducted in-depth interviews among youth members of the digital generation in three of the most populous Russian cities (with ranking by size and regional location): Moscow (1st; Central), Nizhny Novgorod (5th; East) and Rostov-on-Don (11th; South).

Sampling was carried out using a random-probability sampling procedure while maintaining gender balance. Scenarios (topic guide) were drawn up for the interviews. Each interview was face-to-face and lasted from 60 to 90 min. The intention of the in-depth

interviews was to obtain detailed answers from the interviewees and not for filling a formal form.

These interviews were designed to test a number of hypotheses put forward at the beginning of the study and proved helpful for compiling the questionnaires for the mass survey, which will be implemented in the second stage. Since the age groups mostly involved teenagers, it is important to understand that the data discussed in the paper does not represent Russian youth in its entirety. The study, in coding the interviewees, abides by Moscow University's Code of Ethics to protect the anonymity of volunteers helping scholastic research. The interviewees were coded numerically from number 1 to 24, which is the sole identifier used in the text. The authors hold the master file of the interviewees' socio-demographic and geolocation data.

We decided to use the term 'Generation Z' since we believe that it quite succinctly describes the features of the relationship of the youth generation with media and new technologies. When choosing the term, we relied on the generational approach (Howe and Strauss 1991, 1993, 2000, 2007). Representatives of Generation Z are referred to as 'digital natives' (Prensky 2001) since being born after the twin developments of ITC technology and the Internet in the early 1990s, they are all native users of computers, video games, and the Internet. By contrast, people born in the 1970s or earlier who had to learn to use ITC technologies and the Internet as adults – Prensky (2001) called 'digital immigrants'. White and Cornu (2011) give Generation Z a variance of terms, such as 'digital tribe', 'digital generation', and formulated 'digital residents' and 'digital visitors' to contrast different age groups.

The interviews' data was used to construct two types of mathematical objects describing the youths' media preferences. First, a binary relation (in the form of linear order) that corresponds to the priority of different media types according to each subject. Secondly, we construct the media consumption utility functions based on the collected data. For this, we consider three simple but common types of functions (linear, concave power and logarithmic function) and compare, which of them fits the data better. More precisely, if we denote x_i as the time share dedicated to the i-th media activity, then the three mentioned types of utility function will look as follows:

- $U = \sum \alpha_i x_i$in the linear case;
- $U = \sum \alpha_i x_i^a,\ a \in (0, 1)$Zin the concave power case and
- $U = \sum \alpha_i \ln x_i$ in the logarithmic case, where $\alpha_i > 0$ denotes importance coefficients for different media activities in all the cases.

We also intended to use the data to present the media consumption preferences of each interviewee in the form of a binary relation of a simple linear order. Such linear orders are founded on sets of platforms/channels/devices, types of media content, and on the set of existing media resources. Also, based on the interviews, it proved to be possible to develop a one-on-one correspondence between the media and the youngsters' needs, which are satisfied by consumption of those media.

The methods of combining individual preferences, well studied in the mathematical theory of collective decision making, despite Arrow's theorem, make it possible to adequately construct the resulting linear order of the 'general' preferences of a group of individuals based on the set of their individual preferences – linear orders (Aleskerov 1999). In

relation to the problem of constructing a mathematical model of media consumption described in the report, this means the possibility of constructing a single binary relation-linear order corresponding to the system of media priorities of representatives of the generation of post-millennials. Based on this binary relation, as well as the correspondence of the media to the needs that they satisfy, it became possible to build the preferences of the post-millennials and the utility functions representing them.

Results

Needs for socialization and self-actualization

Digital media and its ability to create a new type of media culture enable the audience to satisfy socialization and self-actualization needs at an entirely different level compared to traditional media (Dimmick et al. 2004; Kaye and Johnson 2002). Of particular interest in this context are the studies of the process of socialization in the digital medium and its manifestations: the creation of identity, self-esteem, self-presentation, status, reputation, etc., which correspondents to basic social behavior norms (Homans 1958). Indeed, this pertains to full-scale mediatization of personality (Quan-Haase and Young 2010).

> Interviewee No. 7: Primarily searching for important and interesting information for self-knowledge, self-development, and also music. These two are the main paths.

> Interviewee No. 1: I post my photographs because I want to see people's responses; whether they will be honest, whether they will be in favor of me posting my photographs on social media. But I don't want a lot of likes because they might think that I just hacked and set everything up so that I could put a lot of likes on by myself'.

The primary reasons for media consumption in the DMC are associated not only with socialization as the adoption of prevailing norms and values but with the satisfaction of the need for attachment and involvement in a specific community, the approval of its members and integration into that community (Kümpel et al. 2015).

> Interviewee No. 8: In real life there can be such topics when you can't explain, tell, but on the Internet you write everything, it's easier to say on the Internet than in real life.

The desire to belong to a group is one of the principal motives in human behavior because group identity facilitates the establishment of social ties and the achievement of social validation of one's actions (Guadagno Rempala, Murphy and Okdie 2013):

> Interviewee No. 7: Basically, I rarely comment. There are instances when I enter into debate … If it's video content, then it's a debate over a video clip or commenting on a post. Show off intelligence for a while. However, not to show my intelligence, only pointing out that someone has missed something on their post, and I added a little in the comments. Rather, it will be important for me that it would be appreciated not by as many people as possible, but by the people I communicate with.

The need to belong to a community is closely associated with the need for self-presentation, which arises as to the expected reward for certain social behavior (Kurzban et al. 2015; Lang and Bradley 2010). People are inclined to share information that presents them in a positive light in front of others (Lee and Ma 2012). The quest for status through communication can satisfy the user's need for emotional satisfaction through

recognition by society (Ho and Dempsey 2010) and the expectation of social reward. The search for status is often directly linked to the material need for promoting a professional image to build a career (Baek et al. 2011; Holton et al. 2014):

> Interviewee No. 13: I'm very interested in Instagram right now. I'msubscribed to a blogger, she talks about how to set properly myself up for success, and yes, I'm interested. I browse, and I can even download some application. I can go to YouTube, watch some program. I'm interested in a historical figure or Chekhov's system in theatre. About athletes. I'm into swimming. I can see how someone swam, where particular competitions took place. Of course, it's communication with classmates, with friends. I also read e-books.

For most interviewees, consumption of content on the Internet focuses on meeting social needs, such as communication with the world, the need for clustering with people with similar interests, the need for friendly social relations. In the most popular social media -VK and Instagram -the interviewees subscribe to bloggers, famous people, friends and classmates. They read feeds, put 'likes' and write comments. The most preferred content format are stories:

> Interviewee No. 3: I see Instagram and maintaining my own page as sharing a piece of my life and what you love, not what others want to see in you. And so, I think a person should post what they find interesting.

For interviewees, it is important to be constantly in touch with people, to know what is currently happening in their life. Interviewees are not only active in consuming content, but they publish content in great numbers. According to the interviewees, image is very important on social media because photographs, profile pictures, posts and reposts tell a lot about a person. They use dozens of programs to process photographs and video; they are constantly looking for new software with unconventional techniques of processing content:

> Interviewee No. 5: I like to process, for example, some photographs, make them beautiful, aesthetic, and show them to people.

Owing to age-related psychology, young people are less interested in self-actualization through the process of creating media text. They keep a low profile, and some are even cautious. They find the well-trodden path of socialization through the adoption and reproduction of prevailing norms and values more appealing:

> Interviewee No. 6: I upload photographs, but it's not that often. For example, I can travel to another country and share photographs. However, I don't want anyone to be envious. I want people to see how I spent my time.

Interviewees are very precise when it comes to the quality of their content. Interviewees barely into their teens have their own YouTube channels:

> Interviewee No. 5: I have a literature channel – 'Literature Cat'. Together with my sister we talk about the best or, vice versa, not the best, books in our opinion. We are very pleased that someone is watching us and someone likes our channel. I also have an Instagram page – something in-between my page and channel. I watch feeds from friends; I like something, write comments. However, that's rare. Few of my classmates post anything that I can comment on. I prefer 'liking' to writing comments. A 'like' is a brief expression of your thoughts.

Such media practices are closely linked to the creative act and are primarily used for self-actualization, and not for disseminating content or the desire to popularize it. For interviewees, it is fundamentally important to be creators:

> Interviewee No. 7: On social media, I post entries with my inventions, political news, all sorts of post-irony and sarcastic pictures, posts and jokes.

Entertainment on social media becomes the link between the motivations for being entertained and those for socialization and construction of a personal image (Berger 2014: 590). Nevertheless, the motivation for entertainment is initially linked to the concept of emotional contagion (Hatfield, Cacioppo and Rapson 1993), when users may experience the same emotions as the people in a video, and by sharing that video, they anticipate that the receiver will experience similar emotions (Guadagno, Rempala, Murphy and Okdie 2013: 2312).

> Interviewee No. 4: For me, this is leisure, entertainment, emotional relief; it is also relaxation, chatting with friends, but I can't be with all of them 24 hours. Someone could be at work, someone at school. Someone lives in some part of town, and so we chat, send each other these silly pictures, and have a laugh. This is how I relax. I'm on the bus – I'm watching. What else is there to do on the bus? I can't talk to the next passenger. Why would I do that?

> Interviewee No. 3: For example, I have friends who are interested in fashion. She wants to become astewardess. I find something, and I'm like, 'Check this out, there is information there' – to have a laugh or it could be something serious. On the other hand, we could discuss something. For example, I find some dress, I forward it to her, and we discuss later.

Entertainment, information and others' needs

Entertainment content is the satisfaction of the need to obtain emotions during leisure time:

> Interviewee No. 7: If I play, it happens in winter, as was the case last year and it will most likely be the same this year. Because in the winter I'm not particularly busy, and I can just sit and sit … so I come

from school, do my homework and that's all, I'm playing Warcraft or something like that.

Listening to music takes a special place in the group of entertainment needs. For some interviewees, the desire to draw esthetic pleasure from music is a principal motive for using the Internet:

> Interviewee No. 1: I often listen to the music the guys talk about. I remember the artists and titles of songs, and then I look for them on the Internet. If the singer is popular, then I'll listen to them more frequently. If not, and if I don't like their song, then I won't listen.

Information needs are not always articulated by the interviewees. However, for some interviewees, it is crucial to keep abreast of what is happening:

> Interviewee No. 2: I go on Yandex and scroll down, usually using the phone because I always have my phone in my hands. I find an interesting topic and read. I scroll further, find something and read. Alternatively, I can check some facts mentioned there. For example, some video is mentioned. I go on Yandex image search. I take a screenshot of that video, and it searches for me, and I check whether that is true or not.

The Internet is very important in the educational process and is used to prepare for lessons. English-language sources are used to learn the language and maintain it at a high level. Personal accounts are most often used on educational websites. Furthermore, interviewees regularly referred to foreign-language media outlets to learn a foreign language. Some interviewees also use mobile applications to solve mathematical tasks:

> Interviewee No. 4: Lately I've been taking a tablet computer to school instead of books. In addition, it's convenient for me. There are simply too many books, and I'd take a tablet computer and upload everything there. I'm interested in reading about some leaders, biographies, or find out how to cook something.

Interviewees actively fulfill their instrumental needs through the Internet:

> Interviewee No. 5: For example, if a shop has a website why go there? I can see what's in the shop and I'll already know whether I have to go there or not. For example, I buy movie tickets, some appliances, for example, a charger or earphones.

> Interviewee No. 6: I ordered sneakers because I don't like going just to try them on.

> Interviewee No. 6: I feel uncomfortable if there is no Internet. I'm basically on my own, and I can correspond. I had a situation when I got lost and had no Internet connection. I had to ask people, and the people didn't know how to direct me, which means the Internet would have directed me better.

If they need to know the news, then interviewees trust bloggers as a source of information. On par with socially significant news are events that occur in the life of the bloggers (where a particular party was hosted, which blogger broke up with whom, etc.):

> Interviewee No. 4: Our age difference is not that big, but of course they are older and are some kind of example, because when it comes to TV, then the one who's popular is the one who was already popular from the beginning, there are already some connections. YouTube, Instagram and Telegram are the same people as me; they simply rose through some talent, some resourcefulness and charisma; that's what catches on in our time, people become popular simply because they are what they are. They do their thing, their music, their clips, their photos, they become popular.

Among messaging applications, interviewees prefer WhatsApp because that is where all classmates and family member groups are created. This application is also used to make calls and record audio messages, although messages are the more preferred type of communication:

> Interviewee No. 4: Well, messaging applications are also a form of communication. You can also communicate, just like on social media, only on social media some add photographs, sometimes stories, some articles. There are also some groups whey they talk about applications that may be interesting. However, messaging applications simply facilitate communication.

Discussion

Digital media culture, its status and audience's needs

Self-actualization and socialization acquire special significance for the young audience in the process of media consumption, while the satisfaction of basic information needs to be

associated with physiological needs and the sense of security both acquire lesser significance. There is a clear correlation with the ever-growing use of social media, which forms the living environment for contemporary humans. Social media, in possessing the qualities and characteristics of not only the media but also the social system, transforms the ability to satisfy the needs of the audience. This became possible on the back of the emergence of the digital media culture and answers *RQ1*.

Two key processes of personal social development in society – socialization and self-actualization – are the primary motives in the process of media consumption in the digital medium, but who is the subject of these processes, the real individual or a virtual individual? Castells considers the virtual identity as the second person, different from the real person (Castells 2001: 144), is constructed both consciously and unconsciously and often perceived as a form of a game according to a set of rules. Boellstorff (2008) considers the 'second I' as a property stemming from a fundamentally different substance – virtual reality – and speaks about 'homocyber' as a new type of the human being in a 'second life', and about certain laws of 'cybersociality'. By contrast, Vartanova (2013) speaks about the oneness of the 'social' and 'media' modern-day human being, referring to them as 'homo mediatis'.

The fundamental distinction of DMC from virtual reality is the possibility of being an active participant and creator of social reality, altered by the logic of mediatization. DMC penetrates social reality just as deep as the logic of social order penetrates the media. As a result of this close interaction, the line between the social system and DMC as a generated system is erased.

The DMC built by social media and other new media is not an analog of the social environment but is the social environment. Digital culture as a special reality, different from actual reality, does not exist. The digital environment is perceived as inseparable from social reality, which matches the concept of the integrity of the human psyche. Network space exists not as a separate reality, which can be observed from the sidelines, but as an integral part of everyday life.

Following this logic and taking into account the results of the interviews, we probably should proclaim the end of virtual reality, as one form arising from the activity of another form, external to it, and existing only when the generating reality is active. DMC is not independent (just as social reality is not independent of the media) and is characterized by the socially determined space–time characteristics and laws of existence. Today, the phenomenon of DMC is an integral characteristic of the reality surrounding us, which is the answer to *RQ2*.

The hierarchy of needs and motives for the interviewees to use media, which is the issue of *RQ3,* may be presented as the following hierarchy which is headed by the need for socialization followed by the needs for self-actualization, entertainment, information, education and instrumental.

In this hierarchical list, we deliberately did not include communication needs. The interviews have shown that through the implementation of communication many other needs can be realized – from self-actualization to instrumental, although, of course, the priority is given to the need for socialization. But since the degree of generalization of the needs allocated by us is very high, we decided that communication becomes an instrument for realizing other, more generalized needs.

Media consumption: a mathematical approach

The study showed that youths use media to satisfy various types of needs. Each interviewee told us about their own hierarchies of needs, raise the problem of aggregating all these hierarchies into one. To solve it, we use the mathematical concept of binary relations to model the preferences of youngsters in the area of media practices. We use the linear orders – antisymmetric, transitive, and a connex order of binary relations, which are the sole type of binary relations to be fully described by a simple hierarchy.

When we refer to aggregating many preferences in the form of linear order into one, we solve the problem similar to that of voting. The goal is to construct a social welfare function (preference aggregation rule), which transforms the set of preferences into a single global societal preference using the collective decision theory, i.e. Arrow's (1950) theorem. That theory postulates non-existence of a 'good' preference aggregation rule in case of more than two alternatives (needs, media channels or their combinations) and more than one subject (interviewed youths). A 'good' rule is one that satisfies the following conditions at the same time: non-dictatorial, universal, independence of irrelevant alternatives and unanimity (in sense of Pareto-optimality). However, if we reject the non-dictatorial condition, the construction of an aggregated rule becomes possible. We may do this because the preferences of the interviewees were very similar, and in some cases fully coinciding, so we had a plenty of dictators.

Using the same technique, we may construct the aggregate binary relation over the set of media channels, devices and platforms, which reflects the preferences of all the interviewed youngsters. If we associate each media practice with a quadruple of form (*need*, *media channel*, *device*, *platform*), then we may construct the 'grand' preference over the set of these quadruples (indeed, over the Cartesian product of the needs, channels, devices and platforms sets) and thus over the total set of media activities types. In order to preserve the linear order property, we may construct the total linear order using only the lexicographic principle. The resulting order we may use to estimate the utility function properties.

The preferences over the media activity types set cannot be used to construct the related problem, since its solution will be represented by only one activity, but our empirical data shows that each type of activity has a non-zero share of youths' time. For some activities, this share is significant (like using mobile messengers to fulfill communicative needs), for others – close to zero (watching TV to get news). However, we may use the obtained 'activity-related' preferences to construct the preferences over the possible time allocations between them. There is a well-known microeconomic Debreu theorem, which connects the notions of preferences and the utility function. The Debreu theorem tells that any complete, transitive and continuous preferences can be represented by a continuous ordinal utility function (Rader 1963). This utility function may be regarded as a quantitative measure of preferences over media activities 'menus' set. This function is to be maximized by choosing the optimal media consumption structure. The time and content price constraints may be combined in one inequality: we may regard any minute of time spent on media activities as a lost minute for economic activity, which has its price. Formally speaking, let $x_1, \ldots, x_n$ denote the share of time spent on media activity of type $i = 1, \ldots, n$. Let $U(x_1, \ldots, x_n)$ denote the utility function, that represents the subject-to-be-modelled preferences over possible time allocations between media

and let R stand for the overall temporal and financial resources of the subject. We may present the media activities choice problem formally in the following form:

$$U(x_1, \ldots, x_n) \rightarrow \max_{x_1,\ldots,x_n}$$

$$s.t. \sum_{i=1,\ldots,n} p_i x_i \leq R$$

This form of the media consumer problem may be simpler in the case of the post-millennials. The interviewees did not stress the financial component as a significant constraint limiting the media activities of choice. At the same time, the temporal component was of the greatest importance. This allows us to focus only on temporal constraints and not on financial ones. Another reason for such simplification is that the investigated subjects are mostly dependent financially on their parents, so they have little possibility of making decisions related to spending money. If we take the above argumentation into account, we may formulate the considered problem as follows:

$$U(x_1, \ldots, x_n) \rightarrow \max_{x_1,\ldots,x_n}$$

$$s.t. \sum_{i=1,\ldots,n} x_i \leq 1$$

This problem is of greater importance and needs an entire article to itself, to be described and investigated. Nevertheless, we may formulate the corresponding youths' media consumption problem based on the microeconomic consumer utility maximization problem and consider its basic properties. From the properties of this problem's solutions, we may derive some interesting facts.

If the preferences are non-satiated (the youths tend to spend more and more time on media activities), the optimal media activities set is such that the subject spends all their resources on it. If the preferences are linear (with a utility function $U = \sum_i \alpha_i x_i$, where $\alpha_i > 0$ are importance coefficients for different media activities), the optimal way to allocate both temporal and financial resources is to spend all of them on such an activity, which importance for the subject is the greatest. However, we have discussed earlier that this is an impossible outcome.

If the subject has convex preferences, his optimal media activities set should be more 'balanced': the shares of all the activities in the optimal set are strictly positive. Let us suppose two forms of utility function: the logarithmic function ($U = \sum_i \alpha_i \ln x_i$) and the power function ($U = \sum_i \alpha_i x_i^a,\ a \in (0, 1)$). Both of them give the internal (non-zero) solutions: $x_i = \frac{\alpha_i}{\sum_{j=1}^n \alpha_j}$ in the first case and $x_i = \frac{\alpha_j^{\frac{1}{1-a}}}{\sum_{j=1}^n \alpha_j^{\frac{1}{1-a}}}$. Both approaches to model the media activity 'menu' utility function have the same properties: they generate non-zero time allocations, in which the shares of time dedicated to concrete activities are ordered in the same way as those activities in the initial hierarchy, and this answers *RQ4*.

Conclusion

The paper provided an analysis of generated digital media culture based on the motivations behind media consumption of Russia's Generation Z. The paper found the theory of use and gratification shows changes primarily due to the ever-growing use of social media, which forms the living environment for contemporary humans, and therefore possesses the qualities and characteristics of not only the media but social space as well. Indeed, this paper is about a new type of culture in twenty-first-century society, the digital media culture. This leads to the transformation of the needs of the audience, which from now on can obtain, from the process of media consumption, not only information, knowledge and entertainment but also the satisfaction of needs associated with human social nature. For the audience, the latter become the primary motivations in the process of media consumption. This gives us the ability to model media consumptions using mathematical methods, which were previously specific only for economic models.

The structure and hierarchy of the needs of the media audience the paper proposed are based on the studied literature, using Russian youths for the study. Motivations associated with the needs for socialization and self-actualization head the hierarchical list, followed by entertainment needs, information, educational and instrumental needs. Each of the groups of needs is not always presented in pure form since it tends to be closer to the first two needs, which, as essential needs, are determined by human social nature.

The media consumption process, as a way to allocate time and financial resources according to the audiences' motives and needs, may be considered as a special case of a mathematical programming problem, similar to the consumer choice problem. The subjects have stable preferences over all feasible media activities sets; the subject's opportunities are bounded by time and content price; the subjects choose the most preferable media activities set from all the feasible ones with respect to the constraints induced by these boundaries.

The article raises the question of the transformation of modern-day academic knowledge about society, culture, human beings and the media, partially erasing the boundary between social sciences and humanities, but implementing both discourse analysis and mathematical modeling (Dunas and Gureeva 2019: 32; Jia 2017: 23). The rethinking of the specific theory of use and gratification in media studies occurs on the back of the transformation of the nature of the media, when attributive characteristics of the social space become inherent to the media, and the media practices of individuals gain the status of social practices. In turn society, the social construction of reality that no longer belongs exclusively to agents of social nature has changed.

The research does have limitations. The pilot study was based on a small and non-representative sample because a very limited age group was selected. The sample population should be considered as teenage students. Therefore, it would be completely wrong to draw conclusions about the media behavior of all Russian youth. The data obtained do not represent Russian youth in its entirety but represent the opinions of the group surveyed. However, the exploratory research turned out to be extremely useful, since it provided an opportunity to test a number of hypotheses and highlight the options for a future representative study, a survey of all groups of Russian youth, which will be the object of future research.

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